

## ORIGINAL ARTICLES

## A PLEA FOR THE IMMEDIATE OPERATION OF FRACTURES.\*

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That the open treatment of fractures is now an accepted procedure is no longer disputed, and it is being rapidly adopted by those surgeons who were formerly most violent in their opposition. One point of the controversy as to whether fractures should be operated *immediately* or whether operation should be *delayed*, is still unsettled, and is the "raison d'être" of this paper.

Before entering upon the discussion of the operation, it must be emphasized that immediate operation should under no circumstances ever be attempted by anyone whose technic is not absolutely perfect, for the remarks that follow here are only intended for those operators whose surgical technic is above reproach.

The peritoneum on account of its liberal lymphatic anastomosis, is known to be the most tolerant structure to infection in the body, and experience with this tissue is no guide to the method that must be followed in immediate operation for fractures, for here the parts are very vulnerable and prone to infection. Recent hemorrhage with traumatized tissue offers a good pabulum for the growth of micro-organisms and it is obvious that a recent fracture is very liable to infection, so that it remains a point well taken by the opponents of operation who recognize the possibility of infection.

In answer to this opposition it is shown by Mr. Lane's experience, which I can confirm, that with the strictest attention to detail, infection can practically be avoided. Opponents to immediate operation maintain that 5 or 6 days at least, should be allowed to elapse for by this time the lymphatics are plugged or cofferdammed and the localized leukocytosis makes infection less liable.

The following, in my opinion, is of great importance in reference to immediate operation. In a paper<sup>1</sup> published two years ago I expressed the belief that the displacement of fractures is not due to the normal contraction of muscle such as has been generally maintained, but that the first deformity is due to the trauma and that reposition of the fragments if immediately carried out, is easy, the contraction of the muscles playing but a minor role. This observation is confirmed in the daily experience of every surgeon having to do with fractures, where it is seen that the difficulty of approximating the fragments increases in direct proportion to the time following the accident; in other words, the longer the time that is allowed to elapse the more difficult approximation becomes; this difficulty is due to the fact that the contraction is not one of normal muscular contraction, but that it is the result of the coagulation of the blood that has escaped into the tissues which produces an induration of the muscles and soft parts that makes manipulation of the bone difficult.

It should be mentioned in discussing the indica-

tions for immediate operation in fractures that only those fractures that have been produced by *indirect violence* should be operated. Fractures complicated with great traumatism to the tissues should not be operated immediately.

Experience has shown that when a fracture is operated upon immediately after it has taken place, the fragments are easily approximated as stated above, and if one has not had the experience it is surprising at the ease with which this can be done. As a consequence a smaller incision is made than is the case when the operation is performed later; as a result there is little traumatism of the tissues and less manipulation is necessary, which diminishes the tendency to infection.

**Treatment of Compound Fractures:** The consensus of opinion regarding this class of fractures is that there should be no operative interference, and that conservatism should be observed. Even if reduction is not possible operation should be performed at a later date, 15 days being the average time. My belief is that if possible, the wound should be allowed to heal *entirely*; the fracture can then be treated by operation in the usual way without any danger of infection; this procedure has been advocated by me in an earlier paper<sup>2</sup> which discussed the treatment of compound fractures of the tibia.

It must be emphasized that under no circumstances should a compound fracture be explored; the finger or instrument should never be introduced into the wound, but this should be given a first aid dressing and not disturbed further; when this is done it is astonishing how quickly these wounds heal as compared with the infected wounds that are so frequent when manipulation and exploration have been carried out.

**Indications for Operation:** It should be understood that operation is not advocated for every fracture, but only for those fractures which cannot be treated in the usual way. It has been repeatedly stated by numerous writers that there are many fractures that can be satisfactorily treated without operation, and there is no intent on my part to enlarge the indications for operation. There are, however, a certain class of cases and these form a large percentage of the fractures in which although an ultimate successful result is possible to obtain without operation, nevertheless there are factors of importance in this connection that must be considered, for example:

Given a laboring man with a fracture of the middle of the femur: In this form of injury a very good result is possible to obtain if it is treated by the conservative method but the period of convalescence will be much longer than if operation is carried out. As perfect approximation is the *exception* instead of the rule, the convalescence is delayed in proportion to the size of the callous formed, which is naturally dependent upon the apposition of the fragments. On the other hand with operation, approximation with primary union and little or no callous formation is obtained so that besides the rapid convalescence, the freedom from apparatus that must be constantly watched

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when extension is applied, is a very serious consideration that cannot be ignored. Another example is a patient with a fracture of the upper third of the femur with marked displacement as is usually the case; this requires constant attention for six weeks to obtain anything like satisfactory approximation and to overcome the shortening. During all of this time the patient is probably confined to his bed.

Compare this with an operation properly carried out where a cast is applied at the end of the first operation and which is allowed to remain for at least three weeks; the first dressing is done without any discomfort and subsequent dressings cause no annoyance. My experience has been that if the patients are given an intelligent idea as to the comparative merits of the procedures, there will be few patients who will not choose the operation.

The Bardenheuer method of treating fractures is an excellent one and when carried out by the originator the results are beyond criticism, but there is so much difficulty and detail associated with the proper application of the method that it becomes impractical in the majority of institutions, as well as with most patients. My impression is that Bardenheuer has a class of patients to deal with, who submit to his treatment with a much easier acquiescence than is the case in this country.

*Time of Operation:* Up to this time the most of the supporters of the open operation delay for 7 to 15 days before interfering on account of the danger of infection; by this time the muscles and tissues have contracted and have become so fixed that the replacement of the fragments becomes quite difficult and approximation which would have been easy during the first 24 hours has been converted into a procedure where a much greater amount of manipulation and trauma becomes necessary. Callous formation commences after ten days which complicates the situation.

Lane was one of the first to advocate immediate operation and I have followed his practice and am of the opinion that an operation when carried out under perfect technic is practically free from the danger of infection. This together with the ease with which approximation can be produced and maintained as compared with the operation performed at a later period offers the strongest argument in favor of the procedure.

#### *Details of the Technic:*

1. Lane's Dictum.
2. X-Ray.
3. Hemostasis.
4. Skin Disinfection.
5. Skin Protection.
6. Incision.
7. Approximation and Fixation of Fragments.
8. Drainage.
9. Closure.

As the success of the operation is entirely dependent upon attention to the smallest details, these will be separately considered.

*Lane's Dictum:* "There should be no handling of the tissues whatever."

Experience has shown that practically all fractures can be reduced with instruments and at no time is it necessary to introduce the finger into the wound.

Gloves are always worn and the finger should not be introduced into the wound as there is great danger of the glove finger being punctured by a spicule of bone. Our experience is that this is not an exaggeration of technic for the same results are not possible to obtain by any other method.

After a little practice it is surprising how readily operations can be performed with instruments. As no blood vessels are tied the finger is not introduced for this purpose. The muscle layers fall together readily because the fibres are generally only separated. The incision is made in the line of the extremity and in these regions there is little tendency on the part of the fascias to increase the width of the cicatrix so that these tissues are not sutured; if it is necessary to unite the fascia as in supra-condylar fracture of the humerus or fractures of the femur, catgut can be used and the sutures tied with clamps. The skin is brought together with Michel clips which can be applied without manual contact.

*X-Ray:* It is axiomatic that the diagnosis of fracture should be made by means of the X-ray. The routine examination is not accompanied by any manipulation of the fragments. This point is in direct opposition to the views of many surgeons who advocate conservation, for they maintain that the diagnosis should be made before the patient is submitted to the X-ray. It is essential that a correct diagnosis should be made prior to the operation; any procedure that necessitates the handling of the fragments must be productive of harm, so this can only be avoided by the X-ray and as it is well known that even the most skilled diagnosticians frequently find it impossible to make a correct diagnosis in this chapter of surgery, why waste unnecessary time in the attempt?

*Hemostasis:* Hemostasis is not employed in the majority of fractures. The operation with the "Esmarch" may be easily performed but the secondary oozing due to vasomotor paralysis permits the accumulation of fluid to a much greater degree than if the bandage is not employed and as drainage is never used it is important to limit any accumulation of serum. There is one fracture, in my opinion, in which the employment of the tourniquet is recommended, and that is the spiral fracture of the tibia. This fracture is at times so difficult to reduce that hemostasis is thought advisable as it makes a clear operative field and hence avoids the introducing of the finger. The bandage should always be applied before the skin is disinfected for if it is used after disinfection of the skin, contamination becomes easy. Long-handled Oschner hemostats may be applied during the operation; with their sharp bite the blood vessel is generally occluded. Ligatures are never used so that there is no necessity to introduce the hands into the wound for the purpose of tying ligatures.

**Skin Disinfection:** In the majority of fractures the patients are dirty and require a considerable amount of cleansing before anything surgical can be done. If possible the leg should be shaved dry and it should then be scrubbed with a solution of iodine with benzine 1 to 1000; 5% tincture of iodine should then be applied in the usual way. The benzine has the effect of removing the dirt and grease from the skin and it does not interfere with the subsequent disinfecting effect of the iodine as does soap and water, which should never be used.

**Skin Protection:** The most important part of the entire technic, in my opinion, is the protection of the field of operation against contamination. First the limbs must be covered with sterilized towels which are fastened by hooking them to the skin by means of small vulsella; there is no danger of infection whatever when these are used on the sterilized skin and they fix the towels so that they never slip.

It is important to scratch the skin with a sharp needle to mark the situation and the length of the contemplated incision. If the towels have been attached to the skin, the landmarks and the position of the fragments have been obliterated, and as handling of the skin is prohibited it is essential to know where the incision is to be made; this is shown where the skin has been scratched in a very satisfactory way.

Napkins must then be attached by vulsella close to the skin scratch, so that only a small area of skin is visible on each side of the scratch, then the incision is made over the scratch without touching the skin with the hand; this incision is carried through to the muscle; gauzes are then attached to the fascia by four-pronged right-angled vulsella in such a way that they do not go through the skin so that this structure is entirely excluded from the field of operation. In this way micro-organisms that may be forced out of the upper layers of the skin during any manipulation are not thrown into the wound but are absorbed by these gauzes.

I believe that it is largely due to this part of the technic that we are able to obtain such perfect results, for it is well known that the majority of our wound contaminations come from the skin.

**Incision:** The position and size of the incision is determined by the skin scratch.

**Length of Incision:** It might be stated epigrammatically that the shorter the time after the accident that the operation is performed, the shorter will be the incision.

**Approximation and Fixation of Fragments:** The following principles should be observed in the proper approximation of the bone fragments.

1. The plates in general use for recent fractures (with the exception of vanadium steel) are much too thick. Proper approximation can only be accomplished by mobilization and extension which permits the fragments to come together. The plates are really intended to act as splints and

should not be expected to maintain approximation by their great thickness and tensile strength.

2. In order to obtain perfect approximation the fragments remain together without any displacement, then the plate is applied. As there is no tendency on the part of the bone to displacement if satisfactorily reduced, the plate is not subjected to any strain. These remarks apply only to recent fractures where mobilization is easy.

3. With the patient on the pelvic elevator and with a perineal upright that causes counter-traction and extension of the leg by means of mechanical traction that gives a steady pull, plating of the bone is easy and hardly any of the instruments advocated to hold the bone in position are necessary. The subsequent dressing and plaster spica is easily applied as the patient is not resting on the table so that there can be no shifting of the bone as is frequently the case if the patient is lying on the table under extension, for the bone is apt to slip with the movements of the patient during the time that the plaster bandage is being applied.

The subject of plates and screws and the apparatus used in the operation for bone fracture will not be taken up.

**Drainage:** This should never be employed. Experience has shown that it is not necessary and there is always danger of infection in the track of the tube. With the bone in position and a firm well applied plaster bandage the pressure is equalized so that healing is perfect without any accumulation of serum.

**Closure:** There is no necessity to bring the muscles together by suture as the incision is always made in the direction of the muscle fibres which fall together when the wound is closed.

The periosteum need never be sutured and even if this is attempted, experience has shown that it is frequently impossible to suture this structure satisfactorily.

With the incision made longitudinally, the fascia even if it is not sutured, shows no tendency to cause widening of the scar so that all that is necessary is to close the skin with clips which obviate the necessity of introducing the hand into the wound.

#### References:

- 1 Observations Upon the Open Treatment of Fractures, Surgery, Gynecology and Obstetrics, February, 1911, pages 162-65.
- 2 Treatment of the Spiral Fractures of the Tibia, California State Journal of Medicine, May, 1913, page 188.

## A NEW TREATMENT OF POLIOMYELITIS.\*

By D. H. MOULTON, M. D., Chico.

In presenting this paper to you, I wish to offer for your consideration that which seems to me to be of great import at the present time.

We all know from our observation and from our readings what terrible afflictions the recent

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